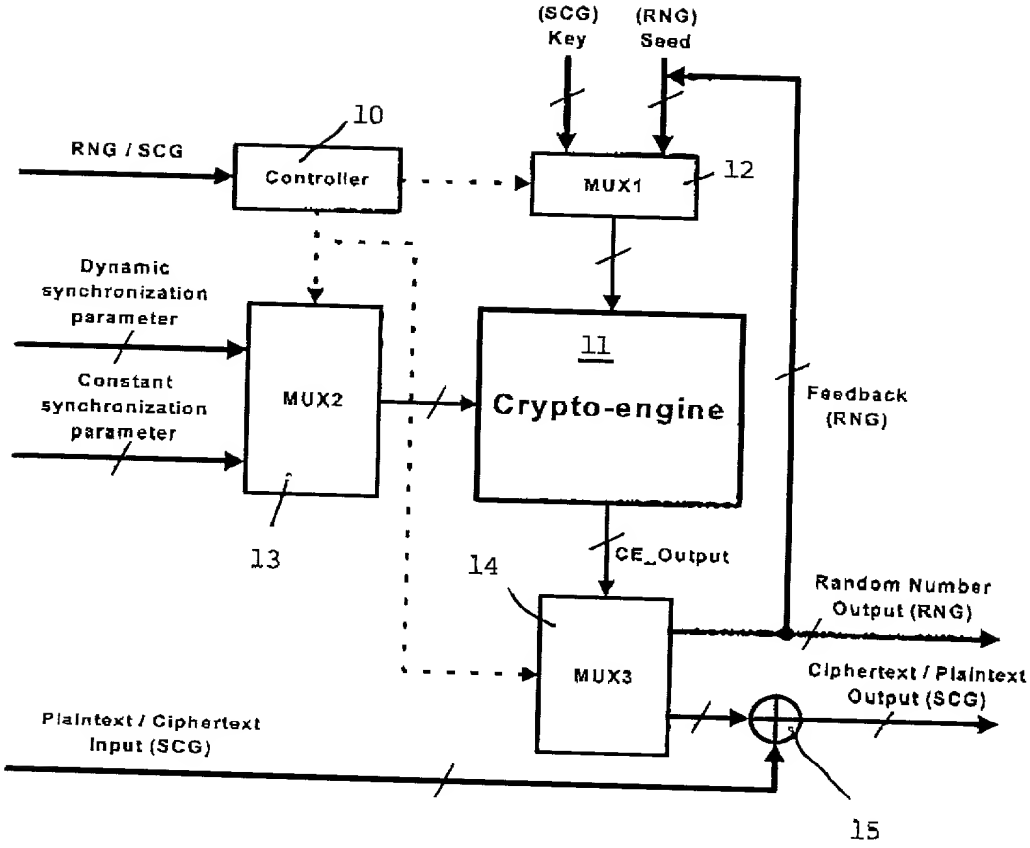

Figure 1

Control Signal

Bundled Input / Output Data

XOR Function

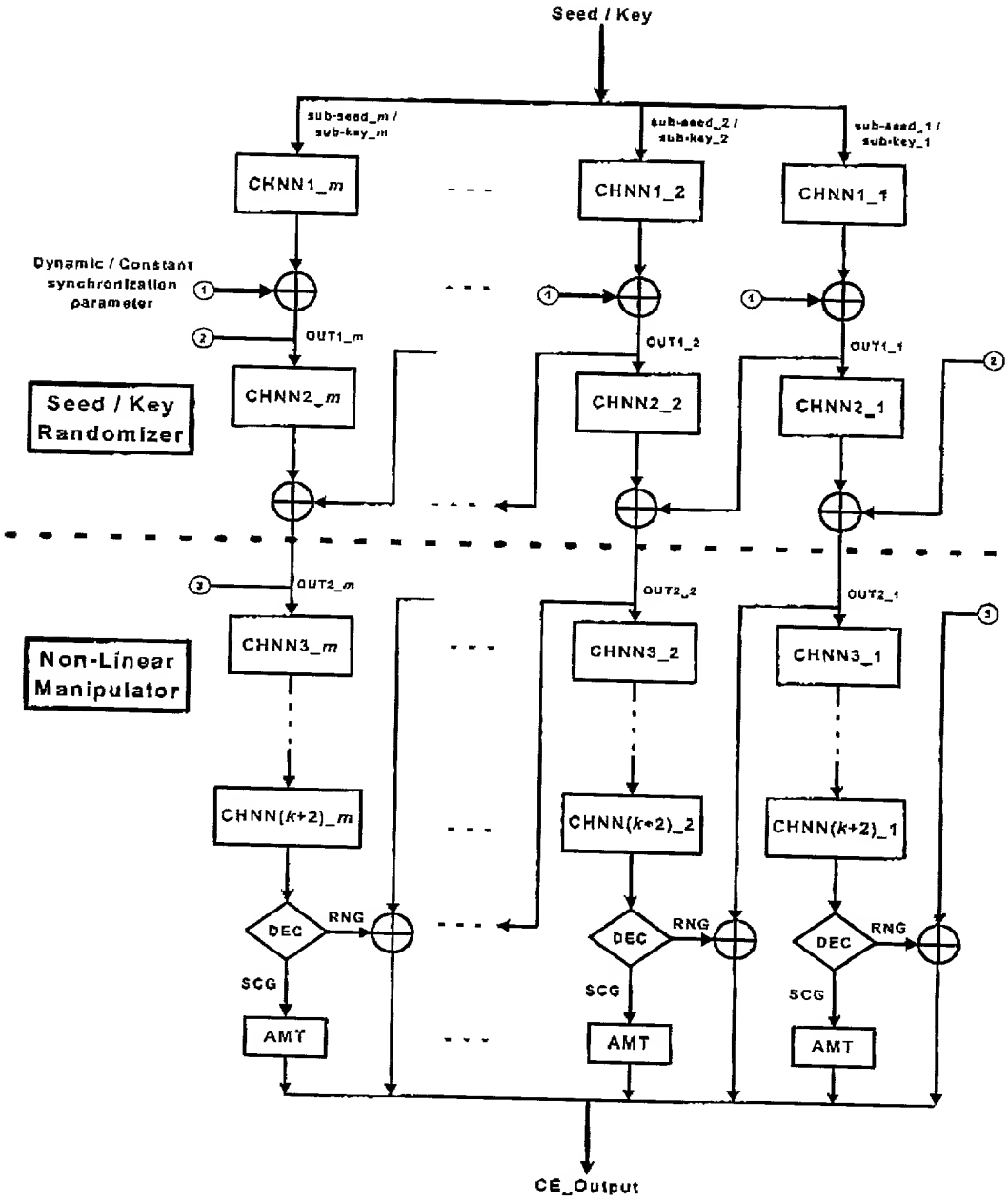
Seed / Key
sub-seed_m / sub-key_m
sub-seed_2 / sub-key_2
sub-seed_1 / sub-key_1
CHNN1_m
CHNN1_2
CHNN1_1
Dynamic / Constant synchronization parameter
OUT1_m
OUT1_2
OUT1_1
Seed / Key Randomizer
CHNN2_m
CHNN2_2
CHNN2_1
OUT2_m
OUT2_2
OUT2_1
Non-Linear Manipulator
CHNN3_m
CHNN3_2
CHNN3_1
CHNN(k+2)_m
CHNN(k+2)_2
CHNN(k+2)_1
DEC
RNG
SCG
AMT
CE_Output

Figure 2

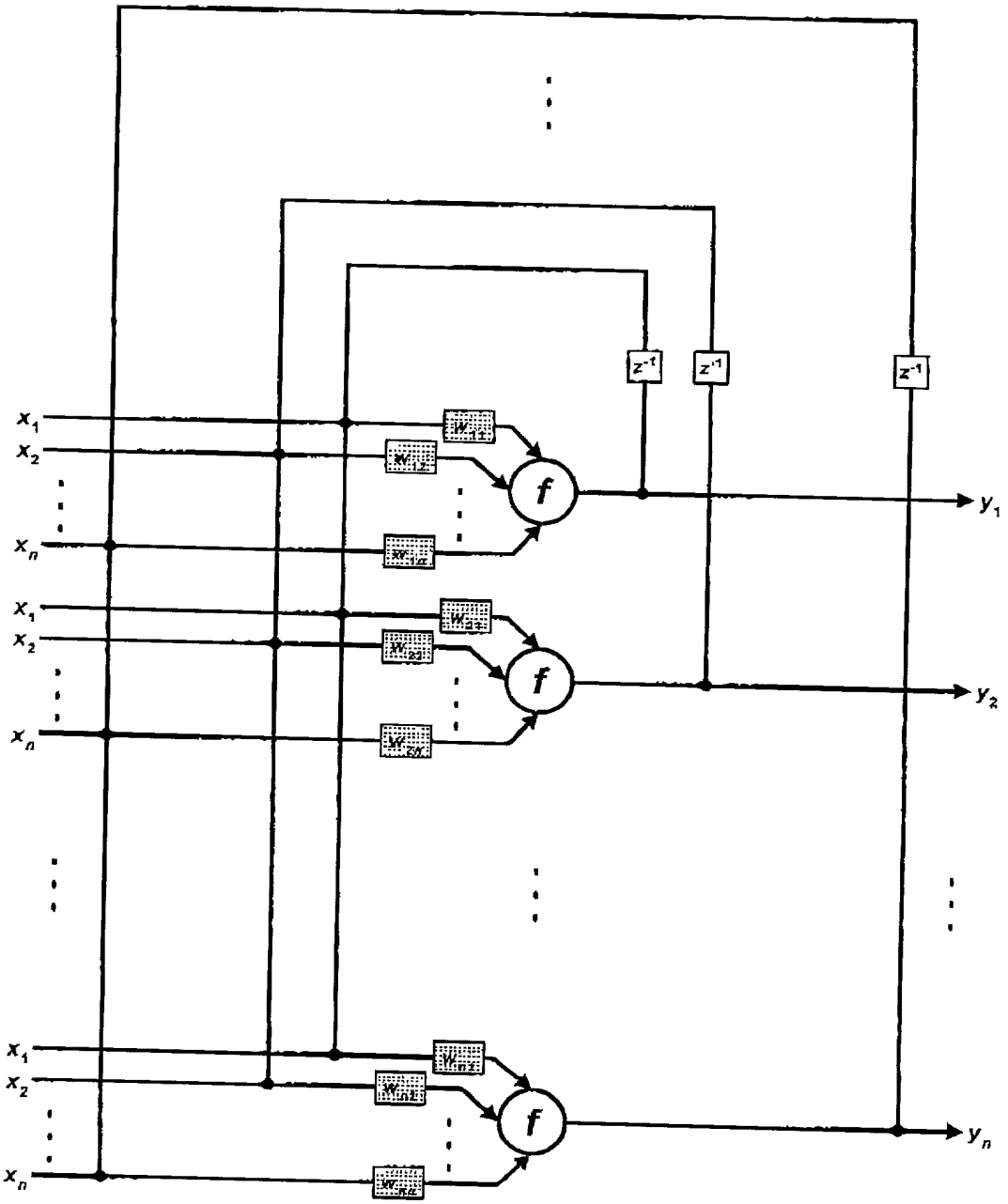

Figure 3

w_{ij} : Synaptic Weight from neuron i to neruon j
x_i : Input
y_i : Output

Attractor	11111000	11110001	11100011	11000111	10001111	00011111	00111110	01111100	11111111	11110000	11100001	11000011	10000111	00001111	00011110	00111100	01111000
Input	00100000	01000000	01000001	00000001	00000010	00000100	00001000	00010000	00000000	01100000	00100001	01000010	00000011	00000110	00001100	00011000	00110000
	00110001	01010001	01001001	00100011	00000101	00001010	00010100	00101000	00010001	01101001	01100101	01010011	01000111	00001001	00010010	00100100	01001000
	01010000	01100001	01100011	01000011	00000111	00001101	00011001	00101001	00100010	01110001	10101001	10000001	01001011	00001111	00011101	00110101	01011001
	01010010	01100010	01101011	01000101	00001011	00001110	00011010	00110010	00110011	10010000	11000000	10100011	10000100	00010111	00011110	00111010	01101010
	01100100	01110011	10000000	01100111	00010011	00010101	00011100	00110100	01000100	10110010	11010001	10100101	10000111	00101011	00101101	00111100	01110100
	01101000	10100000	10010001	10000010	00100101	00010110	00101010	00111000	01010101	11010100	11010010	11000011	10001011	01001101	00101110	01011010	01111000
	01110000	10100100	10100001	10000011	00100111	00011011	00101100	00111001	01100110	11101000	11100001	11000101	10010101	01101111	00111111	01011100	01111011
	01110010	10110001	10100010	10000101	01000110	00011111	00110110	01010100	01110111	11110000	11100010	11001010	10100110	10001110	01010110	01111110	10110100
	01110101	10110101	10110011	10001001	01001111	00100110	00111011	01011000	10001000	11110110	11101101	11011011	10110111	10010110	10011010	10101100	10111000
	01111001	11001000	11000001	10010010	01010111	00101111	00111101	01101100	10011001	11111001	11110011	11100111	11001111	10011111	11011110	10111101	11111100
	10101000	11010000	11000010	10010011	10000110	00110111	00111110	01101101	10101010								
	10110000	11011001	11000100	10100111	10001010	01001010	01001100	01101010	10111011								
	10111001	11100000	11001001	10101011	10001101	01001110	01011101	01111010	11001100								
	11011000	11100100	11010011	11000110	10001111	01011011	01011110	01111100	11011101								
	11011010	11101001	11010101	11000111	10010111	01011111	01101110	01111101	11101110								
	11101100	11101010	11100011	11001011	10011011	10001100	01111111	10011000	11111111								
	11110100	11110001	11100101	11001101	10101101	10011101	10010100	10111010									
	11111000	11110010	11100110	11010110	10101111	10011110	10011100	10111100									
	11111010	11110101	11101011	11010111	11001110	10101110	10110110	11011100									
	11111101	11111011	11110111	11101111	11011111	10111111	10111110	11111110									

TABLE 1

Figure 4

Attractor	10110110	01110110	01111100	01011101	11001101	11001011	10101011	10110011	11111111	10100011	01110100	10110010	01011100	00110110	01001101	11001001	10001011
Input	00010010	00010000	00000100	00001100	00001000	00000001	00000011	00000010	00000000	00000110	00010100	00011000	00000101	00001001	00001010	00100001	00100010
	00011010	00010110	00010101	00001110	00001101	00001011	00000111	00010011	00010001	00010111	00011110	01000100	00101101	00001111	00011011	01100011	00100111
	00100000	00100100	00011100	00011101	00011001	00101001	00101011	00100011	00101000	00101110	00111100	01010101	01000111	01001011	10000001	10000010	00110011
	00100110	00100101	00101100	00011111	01000001	01000011	00101111	00101010	00111001	00110000	01010110	01011010	01001000	10001101	10001011	10001001	10010000
	00110001	00110100	00111101	01000000	01001001	01101011	10000000	00111011	01000010	00110110	01100000	01011100	01001101	11000000	10001110	10011010	10100110
	00110010	00110101	01000110	01000101	01001010	10000101	10000111	10000110	01010011	00111111	01110001	01100101	01011001	11001001	10011111	10100011	10110010
	00110111	00111000	01010000	01001100	01001111	10001000	10000111	10010010	01101010	01110010	01110100	01101100	01101111	11001111	10101001	10100101	10110111
	00111010	00111110	01010100	01001110	01011011	10001001	10001010	10010111	01111011	10110100	01111110	01111101	11001100	11010001	11000011	10101010	10111000
	01100010	01010010	01010111	01010001	01100001	10001111	10010001	10100000	10000100	11110000	11100100	10011100	11011000	11101000	11100001	10111011	11010010
	01110011	01100110	01011110	01011000	01101001	10011000	10011011	10100010	10010101	11110110	11110101	11011110	11011101	11111001	11101011	11100111	11111010
	10010110	01100111	01100100	01011101	10001100	10011001	10100001	10100111	10101100								
	10011110	01110000	01101110	01011111	10011101	10101101	10101000	10101110	10111101								
	10100100	01110110	01110101	01101000	11000101	11000001	10101011	10110001	11000110								
	10110000	01110111	01111000	01101101	11001000	11000111	10101111	10110011	11010111								
	10110101	01111010	01111100	01111001	11001101	11001010	10111001	10111010	11101110								
	10110110	10010100	01111111	11000100	11001110	11001011	11000010	10111111	11111111								
	10111110	10111100	11010000	11010101	11011001	11011010	11010011	11100000									
	11100010	11010110	11010100	11011100	11011101	11011011	11100011	11100010									
	11110010	11110100	11111000	11101100	11100101	11101001	11101010	11110001									
	11110111	11111110	11111100	11111101	11101101	11101111	11110111	11110011									

TABLE 2

The permutation matrix mapped the original (0,1,2,3,4,5,6,7) row into permuted (4,7,2,1,6,0,3,5) row.

Figure 5

Statistical test	Required interval	Output X_{out}	Result
Monobit test	$9654 < X < 10346$	10036	Pass
Poker test	$1.03 < X < 57.4$	6.1576	Pass
Runs test	Run = 1, $2267 \le X \le 2733$	2505	Pass
	Run = 2, $1079 \le X \le 1421$	1227	Pass
	Run = 3, $502 \le X \le 748$	616	Pass
	Run = 4, $223 \le X \le 402$	303	Pass
	Run = 5, $90 \le X \le 223$	176	Pass
	Run ≥ 6, $90 \le X \le 223$	177	Pass
Long run test	Run ≥ 34, $X = 0$	0	Pass

Table 3

Figure 6

Statistical test	Required interval	Output X_{out}	Result
Monobit test	$9654 < X < 10346$	10073	Pass
Poker test	$1.03 < X < 57.4$	5.5616	Pass
Runs test	Run = 1, $2267 \le X \le 2733$	2464	Pass
	Run = 2, $1079 \le X \le 1421$	1258	Pass
	Run = 3, $502 \le X \le 748$	629	Pass
	Run = 4, $223 \le X \le 402$	353	Pass
	Run = 5, $90 \le X \le 223$	157	Pass
	Run ≥ 6, $90 \le X \le 223$	143	Pass
Long run test	Run ≥ 34, $X = 0$	0	Pass

Table 4

Figure 7